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**Citrus Insect Control
For August, 1957**

Let's Start The Grove Right

**Citrus Institute At Camp
McQuarrie, Aug. 12-16**

**Effect of Heat Treatment
Temperatures On The Sur-
vival of Microorganisms
In Orange Concentrates
And Semi-Concentrates**

**Increased Utilization Of
Grapefruit Through Im-
provement In Quality Of
Processed Products**

**New Citrus Queen Named
By Citrus Commission**

**50th Anniversary California
Experiment Station**

**Citrus Advisory Committees
Named**

**Over Million Citrus Trees
In Indian River County**



MISS CAROL BALDWIN
New Florida Citrus Queen. (Story on Page 16)

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R. M. Pratt

Citrus Insect Control



R. B. Johnson

For August 1957

W. L. THOMPSON
R. B. JOHNSON*
R. M. PRATT
Florida Citrus Experiment
Station, Lake Alfred



W. L. Thompson

The most important pest in August will be rust mite. This year the population started to increase in late April, more than a month earlier than in any year of the previous six, for which records are available. The average infestation has increased rapidly since and is at a record high level on leaves and a near-record level on fruit. A peak will be reached late in July or early in August, but the general level will continue to be high through August. As a result of the heavy rust mite infestation, there is more early russetting of fruit than has been seen in recent

scales will be in the young stages. Until after a new hatch begins early in August, there will be too many adult scales with eggs present for a good kill to be obtained.

Mealybug infestations have all but disappeared.

SPRAY PROGRAM

Pest control activity should be at a minimum in August. Nevertheless some groves may need a treatment for either scale or rust mite control. Groves that were sprayed before July should be checked for scale infestation during the latter part of the month. Due to favorable moisture

are for light infestations but if there is any doubt, use the maximum amounts. The next preference is a mixture of about 0.7 percent oil plus either 1 pound of 15 percent parathion or 3 pounds of 25 percent malathion. An oil emulsion spray is, of course effective, but an August or September application of 1.3 percent oil is very likely to depress solids and retard degreening. An oil emulsion at 0.7 percent oil with or without parathion may also affect solids and color but not as much as 1.3 percent oil. An August or September oil application is almost certain to depress solids and retard degreening to a marked degree following an oil spray that was applied after mid-May. Under no conditions should an oil spray be applied on tangerines in August or later if a high percentage of first grade fruit is desired.

Soft brown scale is a problem in some groves. For control, use 3 to 4 pounds of 25 percent malathion per 100 gallons. Make the application when there is a high percentage of scale in the younger stages. A 1.3 percent oil will also kill soft brown scale but its limitations should be considered. Parathion is not effective.

Rust mite control will be necessary in many groves. Either wettable sulfur at 10 pounds per 100 gallons or a sulfur dust are the safest forms of sulfur and should be applied on tangerines, Temples, and early varieties of oranges. On mid-season or late varieties of oranges and grapefruit, 1 gallon of lime-sulfur plus 5 pounds of wettable sulfur per 100 gallons may be used.

As stated in the July issue, zineb is not yet recommended by the Citrus Experiment Station but has been suggested for limited use on a trial basis. It is suggested where zineb is tested that a thorough application should be made.

Details of spray schedules and the various materials used will be found in the "Better Fruit Program" and

(Continued on page 10)

SCALE AND MITE ACTIVITY BY DISTRICTS*

District	Purple Scale	Red Scale	Purple Mite	Rust Mite on leaves	Rust Mite on fruit
West Coast	5.57	3.76	1.12	3.20	3.20
Indian River	4.64	4.19	1.59	2.17	2.08
Upper East Coast	4.17	5.25	1.50	3.00	2.50
Gainesville	3.33	4.34	.67	0	0
Orlando	4.39	3.65	1.00	2.38	2.26
Brooksville	4.39	.89	.22	2.16	2.16
Ridge	5.35	3.80	1.79	3.80	4.00
Bartow	4.33	3.89	.89	3.86	4.00
State Average	4.66	3.83	1.20	2.75	2.65
Last Year	4.46	3.37	1.35	2.25	2.15

* Third week in July. Activity is computed from populations, amount of hatching of scales, and number of groves with increasing or decreasing infestations. Activity is considered high if above 4.0 for purple scale, 3.0 for red scale, and 1.5 for mites.

years. Further damage may be expected where groves are not watched closely and rust mites kept under control at all times, regardless of the choice of spray material.

Purple mite populations have been declining since mid-June and infestations are negligible in most groves. The level will be low through August.

Neither Florida red or purple scale are expected to be much of a problem in August. In those groves where control is necessary, best results will be obtained late in the month when a higher percent of

conditions many groves were sprayed during early June and in such groves scale may increase enough by Fall so that a scalicide may be necessary. It is especially important to check purple and chaff scale on fruit of tangerines and all early varieties of oranges and grapefruit. Where either of these species of scale feed on the fruit they cause an injury that prevents the injured area from degreening in the packing house.

Rust mites are usually a problem in August and regardless of the spray program, periodic inspections should be made and if infestations develop, control measures should be taken.

Scale Control: The preferred scalicides for August are 1 to 1.7 pounds of 15 percent parathion, or its equivalent in other forms, or 3 to 5 pounds of 25 percent malathion per 100 gallons. The minimum dosages

* Written July 23, 1957. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.

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"I followed a rotary cutter in tall Johnson Grass. Hoe thoroughly chewed up stubble and roots.

"You can just hoe around the tree, leave weeds or cover crop between tree rows to control wind erosion."

R. J. Patrick



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Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1938, at the post office at Bartow, Florida, under act of March 3, 1879.

Let's Start The Grove Right

A citrus grove usually represents a lifetime investment. With this in mind the grower should enter into the venture with the expectation of receiving a return on the investment equal to or larger than on other similar ventures. He should realize that the return on the investment will mature over a period of many years. This necessitates serious thinking concerning planting and the development of a grove.

In developing a citrus grove we follow several chronological steps. Each of these steps represents a decision the grower must make and these decisions are a contributing factor to the grower's economic success. Of course the first necessity in developing a grove is to have sufficient capital or adequate financing. Having hurdled this problem, the grower finds himself in the position of selecting the grove's location. At this point he should consider what determines the value of citrus land. There are several horticultural aspects with which we are concerned and these must be met in order that the grower achieves the best results. Of the several horticultural aspects: one must consider the natural soil fertility, air drainage, frost protection, and moisture conditions. Any one of these conditions may act as a limiting factor to the production potential of the grove. Even more important at the present time in determining the value of citrus land is the present economic condition that exists throughout the United States. The purchasing power



JACK T. McCOWN
ASSISTANT CITRICULTURIST -
AGRICULTURE EXTENSION
SERVICE
UNIVERSITY OF FLORIDA
AT MEETING
CITRUS SUB-TROPICAL INSTITUTE

of the consumer has been such that the grower, processor and other segments of the citrus industry have received excellent returns on their investments. The high net returns received by Florida growers during the

past several years have caused the cost of land suitable to the production of citrus to advance in price. In many cases the land, which is bringing a premium to the seller, does not fully meet the horticultural characteristics needed for the most satisfactory production of citrus.

After purchasing the land the next chronological step is selecting what to plant — this includes variety, rootstock, spacing, and finally securing the trees. Determining variety and rootstock could involve quite a long discussion which we choose to omit at this time. However, we would like to state that present planting trends and the availability of trees play as an important part in determining the variety as does the grower's own personal choice. In securing the trees the grower has two choices. First, to produce the trees himself — this involves many pitfalls but can be a source of quality trees; secondly, he may choose from the available commercial nursery grown trees. Commercial citrus nurseries in Florida are generally doing a good job in producing healthy and vigorous growing trees. Most of our nurserymen stay abreast of the current recommended practices regarding budwood selection and seed sources for rootstock thus producing the finest trees that they know how. However, the tremendous current demand for citrus trees leads to and encourages poor practices by some.

Having located a source of trees, the next step in developing the grove is land preparation. Lands planted

prior to World War II were generally cleared with the aid of tractors, dynamite and grub hoes. This involved a long, hard job but usually resulted in providing an excellently prepared seed-bed for planting. Today we prepare the land with bulldozers and often trees are planted within the next few days. This method certainly has enabled us to do a faster job of removing the trees and brush; however, we often fail to remove all the roots which really completes the job of proper land preparation. On sand ridges where scrub oaks are present the removal of these roots are most important for if they are not removed they provide a source of possible root diseases which may affect the citrus trees in subsequent years. Land preparation of the flat woods soils involve an additional problem, that of constructing proper water control measures; and it now appears that much of the future citrus plantings in Florida may be on these types of soils. So — in using these soils the grower must first consider why these areas merit planting — if they do. It should also be pointed out that even though flat wood soils are properly bedded and a water control program carried out, they still present a problem of having a restricted rooting zone. Present citrus returns indicate that citrus can be grown profitably on the better types of these soils; however, the grower must realize that a restricted rooting area will also restrict the producing capacity of the tree. Thus, production on these soils cannot equal production in other areas of the state where citrus is grown on soil types that do not restrict the rooting zone. It should be remembered that the growers of citrus on flat woods soils will be in direct competition with growers in all parts of the state as well as other producing areas of the world. Thus again we point out that the grower must feel these soils merit something in order to be planted. The point of total production may be argued by stating that more trees may be planted to the acre on flat-woods soils. However, it must be remembered that regardless of the number of trees per acre, there is only just so much rooting zone available and when this zone is filled with the optimum number of roots we will achieve our maximum production.

At this point, the land has been purchased, cleared, the seed-bed prepared and staked, the trees have been purchased and are to arrive for planting. The next step in developing a grove is the planting and care of the young citrus tree. This

is one of the most important steps in developing a grove, because the care that the young tree receives can influence its production potential. The grower has at this point an obligation to his investment — to plant and care for this tree to the very best of his ability. As stated before, most nurserymen are doing a good job in growing good trees; however, they have a further obligation to the purchaser in digging, pruning, packing, and transporting the trees to the grower and here too, the job is usually well done, but the grower must carry on from here. He **MUST BE READY TO RECEIVE THE TREES**. Sufficient personnel should be available to properly receive the trees and plant them in order not to prolong the time in which the trees will be out of the soil. When the nursery truck arrives the grower should have adequate facilities to protect the trees from dying. This would include water, tarpaulin to provide shade, and if the trees cannot be planted immediately they should be properly healed in until such time that they can be planted. In recent years grove owners have experienced an increasing percentage loss of newly planted trees. In many cases this loss during the first year has reached 50 percent and higher. Currently Dr. Gordon Grimm of the USDA Horticultural Field Station in Orlando is conducting research to determine the major cause for loss of newly planted citrus trees. Results to date indicate that the major loss of newly planted citrus trees is that of a physiological nature which may be associated with the transplanting and care of the young trees. A preliminary report shows that the loss of feeder roots by a young tree during transplanting is perhaps one of the major causes for young tree dieback and often death of the young tree. It also shows that it is significantly important to leave leaves on young trees transplanted in the fall of the year. Included in this report is a study on the effect of exposure of the citrus tree roots to the sun. Preliminary results indicate that exposure to the sun — even for a **SHORT PERIOD** is very detrimental. Trees exposed to the sun for as long as 2½ hours have a high mortality rate. Loss of feeder roots, loss of leaves, exposure to sun and loss of time between transplanting all have a detrimental effect upon the physiological condition of the tree. Any one combination of these will weaken the tree to the point that it does not have the ability to overcome transplanting

as readily as would a tree properly handled.

In experiencing this high percentage of young tree loss we have defeated the original purpose of buying and planting immediately in order to get the trees in production as soon as possible hoping to get an earlier return on our investment. This "haste makes waste" procedure usually necessitates replanting several months later. Thus we have not carried out our obligation to the investment.

In summing it up. A citrus grower developing a young grove should remember these three facts:

1. A citrus grove is a long-time investment.
2. All citrus growers are in direct competition with each other.
3. There are certain horticultural and economic aspects to be considered, **AND ADHERED TO**, in purchasing land and planting; young citrus trees.

These three facts, or steps in developing a young grove involve the growers' ability to make the right decisions: for it is upon these decisions that the future success of the grove depends.

MRS. HARLLEE CHAIRMAN LADIES ACTIVITIES COMM. F. F. AND V. A. CONVENTION

Mrs. J. P. Harlee, Jr., Palmetto, has been named General Chairman of the Ladies Activities Committee for the 14th annual convention of the Florida Fruit and Vegetable Association, according to an announcement by Rudolph Mattson, Ft. Pierce, president of the Association.

The convention of growers and shippers of Florida fruits and vegetables, will be held at Hotel Fontainebleau, Miami Beach, October 9, 10 and 11.

"We are pleased to have received Mrs. Harlee's acceptance of her appointment as chairman of the Ladies Activities Committee. Entertainment of wives of our members and guests is an important undertaking. In many instances it is the first opportunity for guests to enjoy our Florida hospitality."

"We anticipate that the usual lavish ladies entertainment will be provided, with innovations, for this year's convention. Mrs. Harlee will appoint and announce her committee in the near future," said Mattson.

More consumer units of fresh fruits and vegetables are being packaged than ever.

Citrus Institute At Camp McQuarrie, August 12th Through 16th

Citrus growers, caretakers, production managers and their families are cordially invited to attend the 24th Annual Citrus Growers Institute at Camp McQuarrie, Monday to Friday, August 12-16, 1957, Lake County Agent R. E. Norris, Institute Manager, has announced.

The Institute is sponsored by the University of Florida Agricultural Extension Service. Camp McQuarrie is located in the Ocala National Forest near Astor in northern Lake County.

Persons interested in attending are invited to attend the entire week at Camp, or they are invited to come for any part of the program that they wish and stop as long as they wish. Those interested in staying overnight may live in the cabins at the Camp without charge. Reservations for sleeping facilities should be made early and are made on the basis of first come, first served. It is necessary for those attending to bring sheets, pillows and other linens, soap, etc. The only cost for those attending is a nominal charge for meals. Reservations should be made by writing R. E. Norris, County Agent, Tavares, Florida. Please indicate the number of men, women and children in your party. A \$1.00 reservation fee should accompany your reservation, but you receive credit for this on meals when you arrive at Camp.

OFFICIAL PROGRAM

24th Annual Citrus Growers Institute
Camp McQuarrie, Lake County,
Florida

Monday to Friday — Aug. 12-16, 1957
Monday, August 12

R. E. Norris, Lake County Agent,
In Charge

2:00 - 6:00 p. m. — Camp Registration.

6:15 p. m. Supper — Mess Hall.

8:00 — Assembly — Auditorium.

Tuesday, August 13

K. S. McMullen, Extension Service
District Agent In Charge

7:15 a. m., Breakfast — Mess Hall.

8:30 a. m., Announcements — Auditorium.

Joe N. Busby, Asst. Director,
Agricultural Extension Service,
Presiding

Invocation — Rev. Jesse Jones,
Pastor, First Methodist Church, Tavares.

Welcome — R. E. Norris, Lake



R. E. NORRIS
COUNTY AGENT

County Agricultural Agent, Tavares.
Opening Remarks — Dr. M. O. Watkins, Director, Florida Agricultural Extension Service.

"The Breeding and Rootstock Program of the United States Department of Agriculture," Dr. Frank Gardner, Principal Horticulturist, USDA, Orlando.

Intermission

"Irrigating Florida Citrus Groves," Dr. L. W. Zeigler, Prof. of Citrus Culture, Florida College of Agriculture, Gainesville.

"Laying Out An Irrigation Plant," S. E. Dowling, Asst. Agric. Engineer, Agricultural Extension Service, Gainesville.

12:15 — Dinner — Mess Hall.

1:30 — Fred P. Lawrence, Citriculturist, Agricultural Extension Service, Presiding

"Maintenance of Quality of Fruits and Vegetables from Farm Gate to Consumer," Dr. J. M. Lutz, Assistant Head, Quality Maintenance and Improvement Section, Agricultural Marketing Service, U. S. Department of Agriculture, Beltsville, Md.

Pictures and Comments on Recent Travels in Egypt, Dr. J. F. L. Childs, Plant Pathologist, USDA, Orlando.

"Pine Mice and Shrews — A New Problem in Florida Citrus," Jack T. McCown, Assistant Horticulturist, Agricultural Extension Service.

Herbicides in Citrus Groves — A Panel," R. E. Norris, Moderator. Dr. E. O. Burt, Asst. Agronomist, Agricultural Experiment Station, Gainesville; Dr. W. A. Simanton, Entomologist, Citrus Experiment Station, Lake Alfred; Dr. John King, Asst. Entomologist, Citrus Experiment Station, Ft. Pierce.

4:00 p. m. — Adjourn — Fishing, Swimming, Boating, etc.

6:15 p. m. — Supper.

8:00 p. m. — Auditorium — Entertainment — Square Dancing and Games Featuring Mr. and Mrs. Ray Bailey, Tavares, G. T. Huggins in charge.

Wednesday, August 14

K. S. McMullen in Charge

7:15 a. m. — Breakfast.

8:30 a. m. — Announcements.

Jack T. McCown, Asst. Horticulturist, Agricultural Extension Service, Presiding

"Nitrogen Sources and Rates and Potash Levels on Production and Quality of Marsh Grapefruit," Dr. Paul F. Smith, Plant Physiologist, USDA, Orlando.

"Current Grove Practices for Valencia Oranges," Dr. R. C. J. Koo, Asst. Horticulturist, Citrus Experiment Station, Lake Alfred.

Intermission

"Some Facts to Consider in Moving a Larger Orange Crop," Dr. Marshall Godwin, Asso. Marketing Economist, Agric. Expt. Sta. Gainesville.

"Factors Influencing the Quality of Citrus," Dr. Herman J. Reitz, Horticulturist, in Charge, Citrus Experiment Station, Lake Alfred.

12:15 — Dinner — Mess Hall.

1:30 — F. S. Perry, Extension Service District Agent, Presiding

"The Effect of Quality on the Sale of Florida Citrus," Key Scales, Jr., Chairman, Florida Citrus Commission, Lakeland.

"The Chilled Juice Industry," David Hamrick, Director of Quality Control, Fruit Industries, Inc., Bradenton.

Intermission

"The Present Status of the Spreading Decline Program," Dr. J. T. Grif-

(Continued on page 10)

Effect Of Heat Treatment Temperatures On The Survival Of Microorganisms In Orange Concentrates And Semi-Concentrates



E. C. HILL

Because of the great commercial importance of frozen concentrates, interest has been stimulated in the use of heat treatment as a means of controlling deterioration due to microorganisms and the naturally occurring enzymes in the fruit. Heat treatment may be given at any stage in the process and the study reported here was undertaken to observe the effects of the treatment on microorganisms in 2, 3, and 4-fold juices.

The opinion, in general, seems to be that the over mature, damaged, and soft-rot fruits are greatest contributors of contamination to the juice. Wolford and Berry (17) found the total count in juice from fresh, sound fruit to be 12,300 per ml. while juice from the soft-rot oranges was 31,500,000 per ml. of juice. Patrick (14) made a survey of the major citrus juice processing plants in Florida during one season and concluded that the fruit contributed the major portion of the contamination found in the finished product. Faville and Hill (4) investigated a large collection of fruits individually and found that fruits with punctured peel which were not plainly visible often contained a high count of organisms. Faville and Hill (7) checked this observation by inoculating oranges on the tree with identified organisms and

(1) Cooperative research by the Florida Citrus Experiment Station and Florida Citrus Commission.

ROGER PATRICK AND
E. C. HILL
FLORIDA CITRUS EXPERIMENT
STATION, LAKE ALFRED

analyzing later for survival of the inocula in the fruits. Many of the cultures multiplied in what appeared to be physically sound fruits. Brokaw (3) made a survey of sanitation in concentrate plants. After his observations were made, he emphasized the importance of adequate washing and careful inspection of the fruit utilized to reduce the contamination load.

The kinds of deterioration the citrus fruit processor is hoping to combat in concentrate may be designated as "off-flavor" or "off-odor" and active fermentation due to microbial development; also, changes brought about by the enzymes that occur in the juice naturally. Hays (5) isolated some organisms from some off-flavor orange concentrate that were identified as *Lactobacillus*. Murdock, Troy, and Folinasso (11) developed an off-flavor in 20°Brix juice with certain strains of *Lactobacillus* and *Leuconostoc*, isolated from an off-flavor concentrate that had been packed commercially. Hays and Riester (6) reported findings that were similar when strains of *Lactobacillus* and *Leuconostoc* were used. They pointed out that in spite of excellent



ROGER PARTICK

plant care, outbreaks of "off-odor" spoilage were encountered. They recommended flash heating and cooling of all evaporator feed juice to control this kind of spoilage that usually takes place in the evaporators. Moore, et al, (10) observed the destruction of organisms found in frozen concentrated citrus juices stored at 40, 30, 20, 10 and -8 degrees F. over a period of six months. There was a sharp reduction in numbers after one month of storage at all temperatures. The greatest decline occurred at 40°F. and was less marked with each decrease of storage temperature. After six months, the av-

TABLE I
Effect of heat treatment on the destruction of microorganisms in two, three, and four-fold-d concentrates prepared from grove-run Pineapple oranges-e

Temp. °F.	Exposure time sec.	Numbers per ml. of reconstituted juice					
		Dextrose tryptone agar, pH 7.0			Orange serum agar, pH 5.5		
		Concentrates, pH 3.9			Concentrates, pH 3.9		
		2-fold	3-fold	4-fold	2-fold	3-fold	4-fold
None	None	100,000	120,000	200,000	90,000	100,000	180,000
185	3.0	200	80	30	0	0	40
	6.0	250	80	30	0	0	0
	12.0	250	90	50	0	0	0
175	3.0	400	60	10	0	0	0
	6.0	230	70	10	0	0	0
	12.0	250	100	10	20	0	0
165	3.0	220	70	40	120	10	20
	6.0	320	0	30	0	0	7
	12.0	310	60	20	10	0	0
155	3.0	1,250	1,090	1,850	1,250	660	870
	6.0	900	500	320	250	530	200
	12.0	850	200	120	0	260	75
145	3.0	6,300	5,500	4,700	6,700	38,400	3,900
	6.0	4,500	28,230	6,300	4,000	50,000	4,750
	12.0	2,500	6,660	5,850	0	6,330	3,350

d Based on 12.5° Brix juice.

e Mixed culture in active growth phase added before heat treatment because of low count in juice after extraction.

erage reduction in total count of all packs stored at -8°F. was 80 per cent while the average reduction in total pack was 96 per cent in concentrate stored at 40°F. Patrick (13) observed commercial packs of 42°Brix concentrate that were stored at 42°F. Some of the samples con-

the longest exposure in the series. This plan was repeated with each temperature. After each heating time exposure, the juice was collected in a sterile container and flash cooled aseptically.

These experiments were conducted with 2, 3, and 4-fold concentrates

marked deterioration. Only the very soft decayed fruits were discarded from this lot of fruit prior to extraction.

The numbers of organisms surviving each temperature and exposure time, were determined by inoculating dilutions of reconstituted, heat treated concentrate into plates of dextrose agar, pH 7.0 and orange serum agar at pH 5.6; the plates were inoculated at 32°C. for 72 hours.

Discussion of Results

The effects of heat treatment temperatures on the beautiful flora common to grove-run oranges and found in juices prepared from such fruits are shown in Tables 1, 2, and 3. Concentrates of 2, 3, and 4-folds and pH 3.9 (Tables 1 and 3), prepared from grove-run fruits did not show complete destruction of organisms after heat treatment of 165° , 175° , and 185°F. with an exposure time of 12 seconds. However, products so treated may be considered commercially acceptable, since, no organisms or but very few grew on inoculated plates of orange serum agar. It was also noted that the numbers surviving the heat treatment decreased as the concentration of the orange juice increased. Two, three, and four-fold concentrates to which had been added an active mixed culture, showed less survival of organisms after the heat treatment (Table 1), than did concentrates from grove-run fruits held in storage and used without careful culling (Table 3). The pH was the same in each batch of juice. Similar concentrates, pH 3.8 (Table 2), did show complete destruction of organisms in 3-fold juice when exposed for 3, 6, and 12 seconds at 185°F. The numbers surviving in 2 and 4-fold juice may not be of much significance. The results in Table 2, may be indicative of the character

TABLE 2
Effect of heat treatment on the destruction of microorganisms in two, three, and four-fold-f concentrates prepared from grove-run Valencia oranges-g

Temp. $^{\circ}\text{F.}$	Exposure time sec.	Numbers per ml. of reconstituted juice					
		Dextrose tryptone agar, pH 7.0			Orange serum agar, pH 5.6		
		Concentrates, pH 3.8			Concentrates, pH 3.8		
		2-fold	3-fold	4-fold	2-fold	3-fold	4-fold
None	None	375,000	266,600	200,000	200,000	100,000	200,000
185	3.0	140	50	80	35	0	20
	6.0	75	60	140	10	0	30
	12.0	75	60	Spreaders	10	0	20
175	3.0	80	50	50	25	60	90
	6.0	100	120	Spreaders	35	10	30
	12.0	90	60	110	35	10	50
165	3.0	TNTC*	10,500	80	31,500	210	9,800
	6.0	7,000	430	150	2,800	2,660	1,170
	12.0	150	80	110	10	0	30
155	3.0	122,500	88,600	70,000	84,000	93,330	35,000
	6.0	1,000	102,600	70,000	52,500	81,330	42,000
	12.0	1,500	Spreaders	200	35,000	2,330	35,000
145	3.0	200,000	102,000	70,000	300,000	84,000	56,000
	6.0	136,000	126,000	42,000	86,000	107,300	84,000
	12.0	280,000	74,600	70,000	130,000	77,000	56,000

f Based on 12.5°Brix juice.

g Mixed culture in active growth phase and juice from culls was added before heat treatment because of low count in juice after extraction.

* TNTC - Too numerous to count.

tained yeasts which grew at the temperature and produced an active fermentation. Recca and Mrak (15), Ingram (8), (9), observed spoilage in 42°Brix concentrate and isolated some yeasts that were osmophilic in character, some of them growing in sucrose solutions at 75 per cent concentration. Bissett, Veldhuis, and Rushing (2) reported that concentrate processed at 140°F. and above did not develop swells when stored at 35°F. Two and 4-fold concentrate processed at 160°F. did not swell at 80°F. Six-fold concentrates heated to 130°F. did not show swelling in storage. Murdock, Troy and Folinasso (12) observed that yeasts had a greater resistance to heat in concentrate than in single-strength juice.

Experimental Procedure

The experiments reported in this paper were conducted in the pilot plant at the Citrus Experiment Station. The orange juice was extracted with a Rotary press, a 0.030 inch screen in the finisher to obtain approximately 8 per cent pulp by volume. The juice was concentrated to the desired folds and heat treated in a special pasteurizer designed by Atkins and Rouse (1, 16). The heating times employed were 3, 6, and 12 seconds and the temperatures used were 145, 155, 165, 175, and 185 degrees F. The juice was treated with the highest temperature in the series first, using the shortest time exposure and increasing stepwise to

from grove-run Pineapple and Valencia oranges, at pH 3.8 and 3.9, respectively. It was necessary to inoculate two batches of juice each with a mixed culture because the extracted juice did not carry the contamination expected from grove-run fruit. The first batch of juice, from Pineapple oranges, was inoculated with a mixed culture derived from citrus fruit sources; the other juice, from Valencia oranges, was treated with a similar mixed culture derived from packing house culls that were damaged but not fermenting or decayed. The third batch of juice was prepared from Valencia oranges that had been held in storage and showed

TABLE 3
Effect of heat treatment on the destruction of microorganisms in two, three, and four-fold-h concentrates prepared from grove-run Valencia oranges-d

Temp. $^{\circ}\text{F.}$	Exposure time sec.	Numbers per ml. of reconstituted juice					
		Dextrose tryptone agar, pH 7.0			Orange serum agar, pH 5.6		
		Concentrates, pH 3.9			Concentrates, pH 3.9		
		2-fold	3-fold	4-fold	2-fold	3-fold	4-fold
None	None	30,000	80,000	250,000	300,000	40,000	100,000
185	3.0	160	80	100	70	30	30
	6.0	130	50	50	50	30	20
	12.0	150	60	50	100	0	30
175	3.0	200	90	90	60	20	30
	6.0	110	100	130	80	10	10
	12.0	160	60	40	110	30	30
165	3.0	200	200	1,040	500	200	400
	6.0	800	300	840	0	100	40
	12.0	10	110	70	0	30	10
155	3.0	8,200	5,700	4,500	6,800	4,100	300
	6.0	4,200	3,500	4,400	600	5,000	3,900
	12.0	2,700	1,300	800	200	300	600
145	3.0	43,000	7,900	30,000	40,000	20,000	25,000
	6.0	27,000	16,000	12,000	30,000	15,000	25,000
	12.0	2,000	10,800	64,000	6,000	12,100	10,000

h Based on 12.5°Brix juice.

i Only soft rotting fruit discarded.

of microbial contamination, in that the inoculum used was juice from slightly damaged packing house culls, blended with a mixed laboratory culture.

The results given in these three tables do not seem to be influenced so much by the pH of the product as by the character of the microbial contamination. The numbers of organisms surviving may not be significant when considering the stability of the juice, but such results raise a doubt as to the quality of fruit used. No attempt was made to evaluate the change in flavor among the heat treated concentrates.

SUMMARY

The destruction of organisms was not complete in the three batches of concentrates exposed to heat treatment temperatures as high as 185°F. for 12 seconds. However, such exposures at 165, 175 and 185 degrees F. may be acceptable from the standpoint of increasing product stability. The numbers of organisms surviving the heat treatment, diminished with the increased concentration of juice. The nature of the contamination seemed to affect the numbers that survived the exposure, more than did the pH of the juice; however, above 165°F. there was a definite reduction in the numbers surviving regardless of the concentration.

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CAMP McQUARRIE CITRUS INSTITUTE, AUGUST 12-16 (Continued from page 7)

fiths, Member, Industry Committee on Spreading Decline.

"The Spreading Decline Research Program — A Panel"

Fred P. Lawrence, Moderator
For the Citrus Experiment Station,
Dr. H. J. Reitz.

For the U. S. Department of Agriculture, Dr. F. E. Gardner.

5:00 p. m. — Adjourn — Fishing, Boating, Swimming, etc.

6:15 p. m. — Supper — Mess Hall.

8:00 p. m. — Auditorium — Entertainment, Singing, Games, etc., G. T. Huggins in charge.

Thursday, August 15

K. S. McMullen in Charge

7:15 a. m. — Breakfast — Mess Hall.

8:30 a. m. — Announcements — Au-

ditorium.

T. R. Townsend, Volusia County Agent, Presiding

"The Present Status of the Medfly Program," Ed L. Ayers, Commissioner, State Plant Board, Gainesville.

"The Vitamin C Content of Grapefruit According to Size," Dr. William G. Long, Horticulturist, USDA, Orlando.

Intermission

"The Citrus Horn of Plenty" — An Extension Service TV Show.

"The Florida Citrus Exposition — Show Window of the Citrus Industry" — Robert J. Eastman, General Manager.

12:15 — Dinner — Mess Hall.

1:30 — Edsel Rowan, Marion County Agent, Presiding Agent, Presiding

"State Institutions and the Citrus Industry," Dr. Ralph L. Miller, Chairman, State Board of Control and State Plant Board, Gainesville.

"New Citrus Legislation," Vernon Conner, President, Florida Citrus Mutual.

Intermission

"The Florida State Horticultural Society," R. E. Norris, President.

"The Practical Approach to the Problem of Insect and Disease Control in a Typical Year — A Panel" — James E. Brogdon, Extension Service Entomologist, Moderator.

Panel Members —

Charles D. Kime, Jr., Production Manager, Waverly Growers Cooperative;

Wilbur Charles, Production Manager, Florence Citrus Growers Assn.;

Don Kemp, Production Manager, Lake Region Packing Assn.

Lee Mathews, Production Manager, Plymouth Citrus Growers Assn.;

Lail Morthland, Grower.

4:00 p. m. — Adjourn — Swimming, Boating, Fishing.

6:15 p. m. — Supper.

8:00 p. m. — Auditorium — Entertainment — G. T. Huggins, in charge.

Friday, August 16

7:00 a. m. — Breakfast — Mess Hall.

Institute Adjourns

CITRUS INSECT CONTROL FOR AUGUST, 1957 . . .

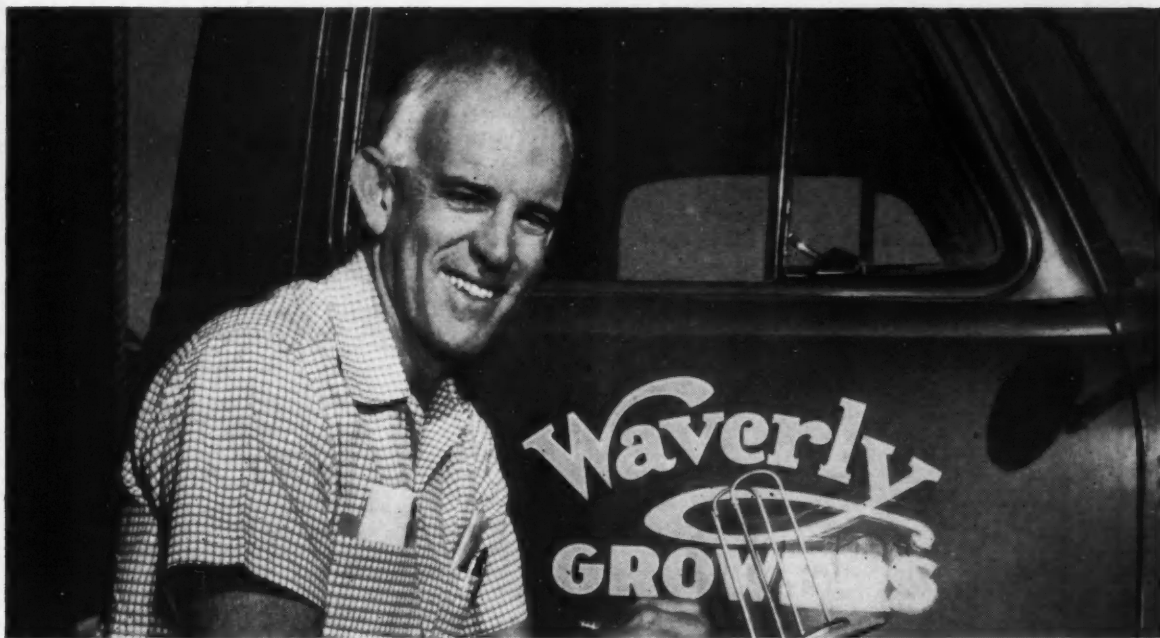
(Continued from page 3)

this should be consulted to determine which materials may or may not be combined. For further information, consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

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Charles D. Kime, Jr., (below), Production Mgr., Waverly Growers Co-Op, Waverly, Florida, says:

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Increased Utilization Of Grapefruit Through Improvement In Quality Of Processed Products¹

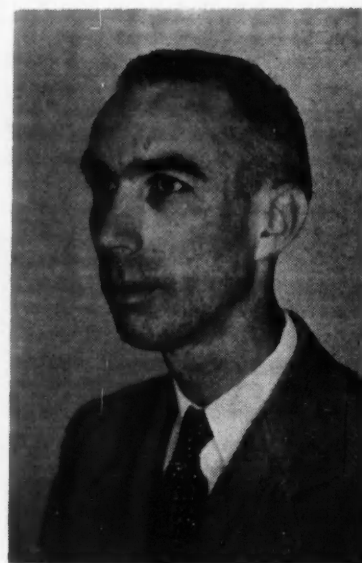


F. W. WENZEL

Increased utilization of grapefruit is needed because the present supply is in excess of demand. The average financial return to grapefruit growers has been small during recent years. During the 1955-56 season 48 percent of the grapefruit crop used was for processed products, such as canned grapefruit juice, canned grapefruit sections, and frozen concentrated grapefruit juice. Obviously, large amounts of these products are being bought by consumers, but improvements in the quality of some of the products packed could and should be made. Better quality in processed grapefruit products should lead to increased demand and subsequently to increased utilization of grapefruit.

This paper will discuss briefly (a) utilization of Florida grapefruit for processed products, (b) factors which affect the quality of processed grapefruit products, and (c) past and current investigations of the Florida Citrus Experiment Station and the Florida Citrus Commission concerning factors upon which the quality of processed grapefruit products de-

F. W. WENZEL AND E. L. MOORE
FLORIDA CITRUS EXPERIMENT
STATION, LAKE ALFRED
AT MEETING
FLORIDA STATE HORTICULTURAL
SOCIETY



E. L. MOORE

pends.

Utilization Of Florida Grapefruit

There has been a gradual increase in the production of Florida grapefruit from about 18 million boxes for the 1936-37 season to a peak production of about 42 million boxes during the 1953-54 season; for the past two seasons approximately 35 to 38 million boxes have been produced. During the same time production of Florida oranges has increased from 19 million boxes in 1936-37 to over 91 million boxes in the 1955-56 season. It may be seen from the figures in Table 1 that the utilization of grapefruit by the Florida citrus processing industry has gradually increased over the years. For example, about 38 percent of the grapefruit used in the 1936-37 season went into processed products compared to 48 percent during 1955-56. The maximum utilization occurred in 1945-46 when 60 percent was processed. The use of oranges for processing has increased from 3 percent during the 1936-37 season to about 37 percent in 1946-47 and to 71 percent in 1955-56. This, it is evident that currently almost 50 percent of the grapefruit and over 70 percent of the oranges grown in Florida are being used for processed products. This is in marked contrast to the situation in and prior to 1936, when most of the oranges and grapefruit from Florida were sold as fresh fruit. In view of these facts, it is time that more emphasis be placed by growers and processors on the production and use of citrus fruits having internal quality necessary for the production of processed products of good quality.

The quantity of grapefruit used for the production of the more important processed grapefruit products is shown in Table 2 for some seasons prior to the 1952-53 season. Statis-

tics presented in Table 3 show that the four products that have been the best outlets for grapefruit during the past five seasons have been canned grapefruit juice, canned grapefruit sections, canned blended juice, and frozen grapefruit concentrate. Perhaps it should be pointed out, since both seedless and seedy grapefruit are produced, that during the 1955-56 season 75 percent of the seedy grapefruit was sent to commercial canneries but the corresponding amount of seedless fruit was 32 percent.

During the last five years utilization of grapefruit (Table 3) for canned juice has varied from less than 7 to more than 11 million boxes, while that for blend has varied only slightly; these two products in 1955-56 provided an outlet for about 11.8 million boxes or 66.4 percent of the total grapefruit used by processors in the major processed products.

Since 1946-47 season, the peak of canned grapefruit sections and citrus salad has ranged from approximately 4 to 6 million cases (24/2's). During the 1955-56 season almost 3½ million boxes of grapefruit were used for canning about 5½ million cases of grapefruit sections and salad, which corresponded (Table 3) to 19.5 percent of the total grapefruit used. Through the use of grapefruit

(1) Cooperative publication by the Florida Citrus Experiment Station and the Florida Citrus Commission. Florida Agricultural Experiment Station Journal Series No. 564.

of suitable quality and good processing procedures, canned sections of excellent quality may be obtained. Such a product has always met with good consumer acceptance, and it is believed that the increased sale of canned grapefruit sections, both in this country and in foreign countries, would provide a means for the utilization of some of the excess grapefruit now available. Since Florida produces over 70 percent of the world crop of grapefruit, it would seem that the potential possibilities for export of canned grapefruit sections should be very great. It is difficult to understand why in recent years the grapefruit section pack continues to be only approximately double what it was in the 1930-31 season.

The largest production of frozen concentrate grapefruit juice occurred during the 1955-56 season, when over 2½ million gallons were produced from about 2½ million boxes of fruit. In contrast to this, during the same season over 70 million gallons of frozen concentrated orange juice were produced. Thus, it is evident that the acceptance and use of frozen grapefruit concentrate by consumers has been far below that of frozen orange concentrate. There was a sharp drop in production during the 1950-51 season of frozen grapefruit concentrate to only about 188,000 gallons caused by poor acceptance of the 1.6 million gallons of this product packed in the previous year. The size of the frozen grapefruit concentrate pack has just in recent seasons reached and during 1955-56 exceeded what it was six years ago in its second season.

About 17 3-4 million boxes of grapefruit were used in 1955-56, by the processing industry for the production of the major grapefruit products listed in Table 3. Canned grapefruit juice provided an outlet for 53.8 percent of this fruit and 17.8 percent was used for the canning of grapefruit sections. In the production of the canned blended juice and frozen grapefruit concentrate packs 12.6 and 12.0 percent of fruit were used, respectively. Canned citrus salad and frozen concentrated blended juice together accounted for 3.8 percent. The utilization figures given in Tables 2 and 3 are only for the more important products listed and, therefore, are slightly less than the actual total amounts of grapefruit used for processing. Some fruit also was used for products such as concentrated processed grapefruit juice, chilled grapefruit juice, and chilled grapefruit sections and salad. Thus



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during the 1955-56 season, 544,070 boxes and 262,099 boxes of grapefruit were used for chilled sections and juice, respectively.

Quality of Processed Grapefruit Products

The meaning of the term, quality, depends upon both the person using

upon such desires. Of course, the price that consumers have to pay for these products is another factor and perhaps the major one which influences total demand; also, today ease of use or convenience is becoming continually of greater importance to the housewife. Recently,

(4, 5) concerned with this problem have also been published. Very briefly and in general, most of the results from these surveys have indicated that most consumers prefer grapefruit products that have a typical grapefruit flavor, are moderately sweet and not excessively bitter. Therefore, these three characteristics may be used as an indication of quality in canned grapefruit juice and other grapefruit products. Characteristics other than these also influence the quality of such products. For example, canned grapefruit sections of good quality should also be firm and uniform in size and appearance; discoloration and undesirable flavors in sections, caused by poor storage conditions, are not desirable. Likewise frozen concentrated grapefruit juice should show no tendency to gelation, should reconstitute easily and then be free from indications of separation or clarification.

To improve the quality of processed citrus products, both growers and processors should consider factual information that has been made available through past research investigations concerning the factors that affect the quality of these products.

the term and the products to which the term is applied. For example, in speaking of fresh grapefruit, growers and shippers place considerable emphasis on the external appearance of fruit, provided it meets maturity standards for internal quality, while processors are chiefly concerned with the internal characteristics of the fruit. Thus, the concentrator is more interested in the total soluble solids in the juice than he is in having fruit free of external blemishes. In packing unsweetened grapefruit juice the use of fruit containing juice of low acidity and high Brix/acid ratio is extremely important, while fruit with a greater acid content, provided that it is not excessive, may be used for the production of sweetened processed grapefruit products.

The definition of quality for processed citrus products should be based upon the desires and opinions of consumers, because the demand for these products depends to a great extent

Florida Citrus Mutual has reviewed (22) some of the consumer surveys (5, 7, 24) which have been made during recent years to determine the

TABLE 1
Utilization of Florida Grapefruit — Fresh and Processed %, **

Season	Fresh fruit sales Thousands of boxes	Fruit processed Thousands of boxes	Fresh and processed Thousands of boxes	Processed % of total
1936-37	11,233	6,759	17,992	37.6
1941-42	8,956	10,143	19,099	53.1
1946-47	10,414	15,866	26,280	60.4
1951-52	19,172	13,678	32,850	41.6
1952-53	17,305	15,035	32,340	46.5
1953-54	20,451	20,029	40,480	49.6
1954-55	19,263	15,660	34,923	44.8
1955-56	19,925	18,661	38,586	48.4

* Figures above for boxes for 1953-54 and previous seasons from Florida Citrus Fruit — 1955 Annual Summary, prepared by Paul E. Shuler and J. C. Townsend, Jr., with the cooperation of Florida Crop and Livestock Reporting Service, Orlando, Florida, Florida Citrus Commission, Lakeland, Florida, Florida Department of Agriculture, Nathan Mayo, Commissioner, and Agricultural Marketing Service, U. S. Department of Agriculture.

** Figures above for boxes for 1954-55 and 1955-56 from Annual Reports, Citrus and Vegetable Inspection Division, Florida Department of Agriculture, Winter Haven, Florida.

TABLE 2
Quantity of Florida Grapefruit Used for Packs of Major Processed Products prior to the 1952-53 Season 1, **

Processed grapefruit product	1936-37		1941-42		1946-47		1951-52	
	Boxes	%	Boxes	%	Boxes	%	Boxes	%
Canned juice	3,057,179	51.9	5,683,874	58.0	7,584,708	49.0	6,812,089	56.3
Canned blended juice	90,367	1.5	1,123,932	11.5	4,273,355	27.7	2,736,950	22.7
Canned sections	2,701,714	45.8	2,852,197	29.3	3,453,827	22.4	2,290,301	19.0
Canned citrus salad	49,205	0.8	122,694	1.3	140,357	0.9	238,054	2.0
Totals	5,898,465	100.0	9,782,607	100.0	15,452,247	100.0	12,077,394	100.0

* Figures above for field boxes furnished by and used through the courtesy of the Florida Canner's Association, Winter Haven, Florida.

** Figures above do not include utilization of grapefruit for other processed products, such as processed grapefruit concentrate.

characteristics of processed grapefruit products which consumers considered to be acceptable and of good quality. The canned grapefruit juices used for one of these surveys (4, 5) were packed in the pilot plant at the Citrus Experiment Station. Other reports on consumer surveys

They should also be aware of current research projects, the ultimate practical object of which is the profitable utilization of the entire grapefruit crop either by improvement in the quality of the major processed products that are now packed, thereby causing better acceptance and

TABLE 3
Quantity of Florida Grapefruit Used for Packs of Major Processed Products from the 1951-52 Season through the 1955-56 Season *, **

Processed grapefruit product	1951-52		1952-53		1953-54		1954-55		1955-56	
	Boxes	%	Boxes	%	Boxes	%	Boxes	%	Boxes	%
Canned juice	6,812,089	50.6	8,338,569	56.2	11,459,550	58.0	8,226,991	53.8	9,595,096	53.8
Canned blended juice	2,736,950	20.4	2,371,543	16.0	2,797,251	14.1	2,074,358	13.6	2,236,437	12.4
Canned sections	2,290,301	17.1	2,553,104	17.2	3,111,999	15.7	3,367,061	22.0	3,179,466	17.8
Canned citrus salad	238,054	1.8	239,489	1.9	379,686	1.9	326,857	2.1	295,422	1.7
Frozen concentrate	1,084,986	8.1	1,159,173	7.8	1,682,141	8.5	1,065,480	7.0	2,128,620	12.0
Frozen blended concentrate	268,231	2.0	133,785	0.9	358,429	1.8	224,596	1.5	365,110	2.1
Totals	13,430,611	100.0	14,845,663	100.0	19,789,056	100.0	15,285,333	100.0	17,790,350	100.0

* Figures above for field boxes furnished by and used through the courtesy of the Florida Canners' Association, Winter Haven, Florida.

** Figures above do not include utilization of grapefruit for other processed products, such as processed grapefruit concentrate, frozen grapefruit sections, chilled grapefruit sections and salad, or chilled grapefruit juice

more demand, or by the development of new processed products or by-products that will provide other outlets for this fruit. Some of these research investigations, that have been completed or are in progress, at the Citrus Experiment Station will be discussed briefly. Principal emphasis concerning processed products has been placed on the factors affecting the quality of canned grapefruit sections, canned grapefruit juice and frozen concentrated grapefruit juice.

An investigation on the effect of storage temperature on quality of canned grapefruit sections was discussed by Huggart, Wenzel and Moore (9). Results indicated that for maintenance of original good quality in canned sections, the products should be held at 70°F. or lower. Marked changes in color, flavor, and firmness that result in lower quality in this product occurred at storage temperatures of 80°F. or above. Another study (10) recently completed has shown that the discoloration or browning of canned grapefruit sections during storage is related to the acidity in the canned product, which is dependent upon the acid content of the grapefruit used. In general, browning occurred during storage more frequently, in the canned sections with the greater acidities.

The effect of cultural practices on the quality of canned grapefruit sections has been subject to investigation during the past three seasons. Discussion of the data obtained when canned grapefruit sections were processed commercially from fruit grove plots that were treated with fertilizer containing various amounts of potash has been reported (27). It was found, as is generally known, that the time at which grapefruit are harvested is a factor affecting the quality of canned sections; also, that when grapefruit were picked at the same time from trees which had received fertilizer containing 0, 3, and 10 percent potash, the firmness of the canned sections decreased with increase in the amount of potash. A similar study using arsenated and unarsenated grapefruit will be completed this season.

Research has been done on various problems concerning the production and storage of frozen concentrated grapefruit juice. Data on changes that occur in this product during storage, such as gelation, clarification, sugar hydrate formations and the very slight loss of ascorbic acid have been published in various articles (2, 8, 13, 14, 15, 18, 25).

(Continued on page 22)

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BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

New Citrus Queen Named By Florida Citrus Commission

Beautiful Carol Baldwin, shapely 18-year-old sophomore of the University of Miami, who says marriage is the "furthest thing from my mind," has been named Florida Citrus Queen to succeed Frances Layton of Winter Haven.

Miss Layton resigned the coveted crown recently to marry Dick Pope, Jr., of Winter Haven.

Queen Carol, daughter of Mr. and Mrs. F. V. Baldwin, Jr., of West Palm Beach, is majoring in television, modeling, dramatics and speech at the Miami institution. She is a member of Delta Gamma Sorority, active in student government having served as under-secretary of student activities, and is a cheer leader.

She is a native of Florida, and is an ardent sports enthusiast, excelling in swimming and water skiing. She is 18 years old, with brown eyes and brown hair. Her height is 5'7"

and she weighs 120 pounds. Her measurements are a neat 36-24-36. She holds numerous other titles, including Miss RCA TV, and Miss Florida Photography of 1955.

She was sponsored in the original Citrus Queen Contest at the Florida Citrus Exposition in February by the West Palm Beach Junior Chamber of Commerce.

The South Florida beauty received her new crown from retiring Queen Frances Layton in Charlotte, N. C., at a citrus festival in that city.

During the balance of the year, Queen Carol will be under contract to the Florida Citrus Commission at Lakeland. Her services will be utilized for the promotion, nationally and internationally, of the Florida citrus industry.

More fruits are finding their way to the frozen dessert industry, reports the USDA. It is estimated that by 1975 total consumption of frozen desserts will be 1,200 million gallons, 60 percent above 1953 production levels.

JOE FULLER JOINS CITRUS COMMISSION

Joseph C. Fuller, administrative assistant to Congressman James A. Haley, has been named to the position of Statistician for the Florida Citrus Commission, it was announced in Lakeland recently.

Fuller succeeds Warren E. Savant, who resigned to accept the directorship of a corrugated box trade organization. The appointment is effective August 1.

Fuller, 35, and a native of Lakeland, is the son of Mr. and Mrs. R. Barnwell Fuller. He is a graduate of the University of the South at Sewanee, Tenn., where he received a bachelor of arts degree in English. He is also a graduate of the University of Florida, receiving a B. S. degree in Agriculture.

He is a veteran of both World War II and the Korean War, and presently holds a Captain's commission in Military Intelligence Reserve.

He is married and the father of four children, and comes to the Commission after serving 3½ years as administrative assistant to Congressman Haley. Prior to that he served as special agent for the Prudential Insurance Co., and at one time he headed the Federal Crop Insurance Program for Polk County. He has also served as salesman in the Plant Food Division of International Minerals and Chemical Corporation.

FOOD MACHINERY APPOINTS NEW SALES ENGINEER

The Florida Division of Food Machinery and Chemical Corporation announces the appointment of Leon Drake as Sales Engineer for canning and concentrate equipment.

Mr. Drake joined the company in 1950 and has served in the Engineering Department as supervisor of canning machinery test work. His practical experience includes plant planning and layout, design of fruit handling equipment, and citrus quality control as related to processing equipment, extraction, stabilization and finishing of juice. He also has represented the company in Europe and the Caribbean area on special assignments with relation to citrus.

A native of Lakeland, Florida, Mr. Drake received a B. S. degree and did graduate work at the University of Florida. He will make his headquarters at the Florida Division's offices in Lakeland.

In 1956 there were 143,485 forest fires reported on private, state and federal lands — a decrease of 1,695 from 1955. However, on the average there was still a forest fire every three and one-half minutes.

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In Florida, magnesium is now classed as a primary plant food together with nitrogen, phosphorus and potash.

The recommendations of the Florida Citrus Experiment Station at Lake Alfred, stress the need for large application of magnesium for Citrus in soluble form and state that it is usually applied as a Sulphate.

Be sure that your fertilizer manufacturer includes EMJEO in your mixtures as a dependable source of soluble magnesium.

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Magnesium

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50th Anniversary California Citrus Experiment Station

The California Citrus Experiment Station, which does for California citrus growers what the Florida Citrus Experiment Station does for Florida citrus growers, recently celebrated its 50th anniversary with an elaborate program in which a number of Florida citrus workers took an important part.

Citrus experts from every citrus producing area of the world gave highly instructive talks on various citrus topics. Citrus diseases, pests and cultural practices were among the important topics discussed.

Among the Florida citrus workers who took part in the program were:

L. C. Cochran, who spoke on "Citrus Viruses, their Economic Impor-

tance and Their Modern Methods of Travel;"

T. J. Grant, "Strains of the Tristeza Virus;"

L. C. Knorr, "Tristeza Investigations in Argentina;"

J. F. L. Childs, "Xyloporosis and Cachexia — Their Status as Citrus Virus Diseases;"

G. G. Norman, "The Virus Free Budwood Certification Program in Florida."

Other speakers from California, Texas and from such foreign citrus producing sections as Israel, Austra-

lia, Brazil, South Africa, Japan and Argentina, gave interesting and instructive talks on the work in the citrus sections of their countries.

Florida citrus workers who took part in the program speak highly of the work being done by the California Citrus Experiment Station and of the entertainment provided for the visitors at the anniversary meeting.

It is believed that final tabulation of a three-year count of citrus trees in Florida will reveal about 43 million trees.



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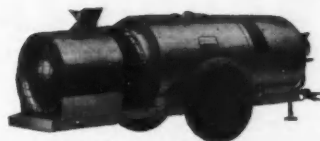
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Citrus Advisory Committees Named

The appointment of members and alternates to the Growers Administrative Committee and to the Shippers Advisory Committee for Florida citrus has been announced by the U. S. Department of Agriculture.

The Committees serve under the marketing agreement and order program regulating the handling of oranges, grapefruit, and tangerines grown in Florida. The period covered by these appointments is August 1, 1957, through July 31, 1958.

The eight members and eight alternates of the Growers Administrative Committee include:

W. R. McMullen, Tampa, and R. H. Prine, Bradenton; Chas. Z. Osborne, Umatilla, and R. H. McKinney, Eustis; Wm. H. Mayfield, and W. A. Prevatt, both of Seville; Chester J. Karst, Orlando, and J. H. Ross, Oakland; Alexander W. Ryburn, Vero Beach, and Philip C. Gates, Ft. Pierce; Chas. G. Metcalfe, Avon Park and Cole Danley, Lake Placid; A. S. Estes, and L. B. Anderson, Jr., Winter Haven; Eugene F. Griffin, Sr., Bartow, and Clayton Logan, Lakeland.

The Shippers Advisory Committee, consisting of eight members and eight alternates include:

H. G. Gumprecht, Jr., and F. S. Johnson, both of Tampa; Robt. V. Phillips, Haines City, and Phil C. Peters, Winter Garden; D. K. Richardson and W. G. Strickland, both of Vero Beach; Robt. H. Reely and E. M. Southward, both of Sanford; Ralph Wetherington, Winter Haven, and H. Y. Griffin, Auburndale; J. G. Ariko, Orlando, and S. C. Battaglia, Winter Park; J. W. Bragin, Clearwater, and A. P. Crutchfield, Howey In The Hills; B. H. Griffin, Jr., Avon Park, and Tom Turnbull, Winter Haven.

The Shippers Advisory Committee makes recommendations to the Growers Administrative Committee, when it is deemed advisable, to limit shipment of certain grades and sizes of oranges, grapefruit, and tangerines. The Growers Administrative Committee considers these recommendations and then submits its own recommendations, together with those of the Shippers Advisory Committee, to the Secretary of Agriculture. The Growers Administrative Committee serves as the official administrative body under the marketing agreement and order program.

VANDERGRIFF GEN.L. CHAIRMAN F. F. V. A. ANNUAL CONVENTION

Roy Vandegrift, Jr., Pahokee grower, has been appointed General Chairman for the 14th Annual Convention of the Florida Fruit & Vegetable Association, according to Rudolph Mattson, Ft. Pierce, President of the Association.

"Mr. Vandegrift has long been a prominent member of this Association, and with the committees which he will presently announce, will present a worthwhile meeting for Florida's fruit and vegetable growers and

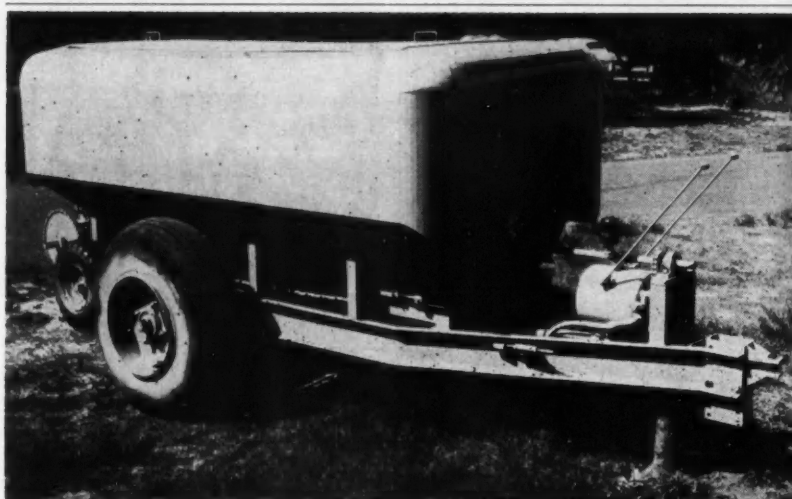
shippers," said Mattson.

"The Convention will again be held at the Hotel Fontainebleau, in Miami Beach, October 9, 10 and 11.

"Each year the size and scope of our conventions have grown and we anticipate more than a thousand persons will be in attendance," Mattson said.

Membership of the Association, a non-profit agricultural trade organization, is composed of growers and shippers of Florida vegetables and tropical fruits.

Headquarters of the organization are at 4401 E. Colonial Drive, in Orlando.



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LAKELAND, FLORIDA

Over Million Citrus Trees In Indian River County

Over one million citrus trees have been tabulated in commercial groves in Indian River County, the Florida Citrus Commission said recently.

It is the sixteenth county to be surveyed by the State Plant Board who, in cooperation with the Florida Citrus Commission, Florida Citrus Mutual, the U. S. and Florida Departments of Agriculture and the Florida Agricultural Experiment Station, is making the tree count census. The study, started last year, will eventually include 36 counties in the Florida citrus belt.

The Indian River County report lists a total of 430,616 orange trees and 756,763 grapefruit trees in commercial groves in the county. Also listed in the report was a total of 9,713 Mandarin variety trees, 62,783 trees bearing Temples, Tangelos, and other hybrid fruits, 4,166 trees bearing Kumquats, Limequats, and other miscellaneous varieties, and 2,431 acid fruit trees of which 382 were Persian Lime and 353 Villa Franca

Lemon.

The report disclosed that Indian River County has a total net commercial acreage in citrus of 17,466 acres; has 56,885 trees in abandoned groves, and 71,670 diseased trees which are declining and out of production. Vacancies in commercial groves exist for some 37,253 trees.

Other counties thus far included in the project are Polk, Lake, Pinellas, Highlands, Lee, Hendry, Collier, Broward, Dade, Orange, Hardee, Martin, Sarasota, DeSoto and St. Lucie. The report includes the combined totals of counties surveyed thus far indicate a total of 30,091,370 trees, of which 19,942,261 are bearing commercial oranges.

Net citrus acreage for the 16 counties was placed at 432,674 acres; 1,280,191 trees were listed in the diseased category, and 416,412 trees in abandoned groves.

The tree census, which has been underway since early last year, will include an estimated 43,000,000 citrus trees when completed.

U. K. TRADE BOARD TO SUPERVISE PURCHASES

The U. S. Department of Agricul-

ture has announced that purchases of fresh and canned citrus fruit under recently announced Public Law 480 purchase authorization Nos. 19-04 and 19-05 issued to the United Kingdom will be under the supervision of the United Kingdom Board of Trade. Inquiries may be addressed to the Board of Trade, Import Licensing Branch, Whitehall, London, S. W. 1.

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Reports Of Our Field Men . . .

PINELLAS AND WEST HILLS-BOROUGH COUNTIES

J. A. Hoffman

Moisture conditions throughout this section are a lot better than in the past several years. Most groves are responding nicely due to the good rains and summer application of fertilizer. Groves have been flushing out with new growth and thus far there has been very little sign of late bloom. Fruit is sizing up good, but next year's crop doesn't appear to be heavy in any variety.

Most oil sprays have been completed by now. Zineb and oil was used in many groves for scale and rust mite control.

EAST HILLSBOROUGH AND PASCO COUNTIES

E. A. McCartney

There has been plenty of rain in most of this section the past month. Groves are looking good, plenty of new growth in most groves — especially young trees. We are through with the Summer application of fertilizer. Some rust mite and scale and spray rigs are busy taking care of that situation.

There are a few Valencias and grapefruit still to be picked. There is a good crop set for next season and it is sizing up in good shape.

Pastures are in exceptionally good condition due to the rains we have had plus fertilizer that has been applied.

So now after telling you what you know already I am going to take a few weeks vacation and hope you all enjoy one also.

SOUTH POLK, HIGHLANDS, HARDEE, DeSOTO AND SARASOTA COUNTIES

C. R. Winfield

During the month of July we have experienced some very hot weather. There has been a lot of rain in some areas while other sections could stand more. However the overall picture is that most areas have been blessed with rains that puts us in a much better position than last year. There is much more water in the ponds and lakes. Vegetable grow-

ers are preparing lands for the Fall crops. Just what acreage will be planted cannot be determined at this time. Cukes, tomatoes, pepper and egg plants will be the principal crops.

The citrus deal for the year is all but over. There is only an occasional crop of Valencias that have not been picked. After the estimate was cut by a million boxes the price picked up a little but it was too late to help the growers.

Grove activity has been mostly confined to spraying with oil or other scallicides. More attention is being given to rust mite control than previous years. The fruit crop looks very good and appears to be sizing well. Some heavy crops will need a supplement feeding in August to obtain size.

SOUTHWEST FLORIDA

Eaves Allison

It is a great pleasure to again be back among old friends and old Lyons customers — a combination hard to beat!

Citrus groves in the Manatee-Sarasota area, where on high ground, are vigorous and carrying a heavy crop of good size. Low ground areas are in some cases showing severe damage from the heavy rains of the past season. In all cases low ground grove owners should avail themselves of the Soil Service's assistance in laying out a drainage program which can and will eliminate all such damage in the future. One bumper crop will pay the cost of the work.

Rust mites have not been too bad so far, and other mites and scale have been no worse than usual. Many growers are including Zineb in their spray programs, so our next crop should produce some interesting information on just how much rust mite control can be had that way and what side results may pop up from it's use.

Pastures fertilized with that good Lyons Fertilizers are lush and heavy and cattle on them are fat, and the smoke of burning stump piles arises again as vegetable growers clear new land for another season's operations.

HIGHLANDS AND POLK COUNTIES

J. K. Enzor, Jr., & R. E. Lassiter, Jr.

Most citrus growers at the time of this writing are in the process of applying their Summer scallicide. In many instances Zineb is being applied with this spray. During the last week we have begun to hear scattered reports of Zineb failures in relation to rust mite control, however, after checking on these reports we could not find but one instance where there was a failure if the material had been used at the recommended rate with the scallicide spray. In this one instance there were probably some unusual circumstances to blame. Up until this date we still feel that the Zineb applications are giving results.

It is about time for growers to apply their young tree fertilizer applications. This Summer application is very important this year in view of the heavy rainfall which we have been experiencing.

This is the time of year when growers should be thinking about applying dolomite or lime where the soil sample report indicate it is necessary. This is a very important part of the program and it should not be overlooked. If best results are to be obtained from the fertilizer applied then the soil pH must not be overlooked.

NORTH CENTRAL FLORIDA

V. E. Bourland

We are having hot, windy weather at the present with spotted showers. Rust mite and scale are very active, and other insects are working in most groves, and growers are very busy trying to keep them under control. Fruit is sizing nicely, and showing up more all the time. All bearing groves have been fertilized, and cover crop is very good. Young trees are looking fine, but newly set trees are still having to be watered. There are still some Valencias on trees, but most all will be moved this month.

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**Uncle Bill Says:**

They is a lot of folks away on vacations about now . . . maybe gone to the mountains er to the beach . . . er maybe jist meanderin' around er vistin' relatives quite a piece from Florida . . . all of which is good fer folks. Could be a lot of vacationers will be all tuckered out when they git home, but anyway they've seen a lot of unfamiliar country, enjoyed making a few friends, 'er jist found a lot of enjoyment bein' away from the telephone fer a little while . . . anyhow, most of us comin' home from a vacation come back with the feelin' that home is jist about the best place in the world.

Actually when we git right down to serious thinkin' about it we don't know any place else where they is so many natural advantages fer good livin' . . . what with all our fine inland lakes, 'en the gulf on one side of the state and the ocean on the other . . . with a climate that, fer year 'round livin' tops anything we know of. Most everybody will agree that our winter weather which brings so many northern folks to Florida can't be beat . . . and in spite of the hollerin' we sometimes do about the summers bein' too hot, if'n we'll check the temperature records we're purty sure to find that even our summers is milder here than they is in a lot of other places over the country.

Then when we git 'round to thinkin' about the business of raisin' citrus fruit most of us are inclined to remember the bad seasons insted of realizin' that such seasons are probably more rare in our business than they are in most any other business.

It's true they is some work attached to producin' good citrus, but they ain't no other business er profession we know of where there ain't some work attached to doin' the job.

So fer as we are concerned Florida and citrus growin' are two things anyone will find it mighty hard to beat.

**INCREASED UTILIZATION OF
GRAPEFRUIT THROUGH IMPROVEMENT IN QUALITY OF
PROCESSED PRODUCTS(1)**
(Continued from page 17)

Thermal stabilization of grapefruit juice for the production of frozen concentrate has been found necessary to prevent the occurrence of gelation and clarification in this product during storage and distribution. Atkins, Rouse and others (1, 2, 3, 19, 20) have reported results obtained from several investigations of this process for the production of frozen grapefruit concentrate of good quality. During storage at 0/F. or lower, undesirable flavors may develop in frozen grapefruit concentrate. Such off-flavors are usually described as being similar to tallow, castor oil, or cardboard. Results of the study since 1953 of this problem were recently reported (17). Oxidative changes are believed to be involved in the development of these off-flavors and it has been found that the maintenance of a sufficiently high peel oil level in grapefruit concentrate helps to prevent either the development or the detection of these undesirable flavors. Two investigations were instigated during the 1955-56 season, at the request of the Quality Advisory Committee of the Florida Canners' Association to determine factors that affect the quality of frozen grapefruit concentrate. The first of these studies was the determination of most of the chemical, physical and other characteristics of 28 packs of commercial frozen grapefruit concentrate that were collected from 11 Florida plants. The purpose of the second study was to obtain data that might indicate the relationship between the

quality of raw grapefruit juice and that of the frozen grapefruit concentrate produced from it. Fruit from different localities were obtained and 11 lots were processed in the pilot plant. Data obtained from these two investigations were presently recently (28) and similar studies are again planned for this season. The effect of fruit maturity on the quality of frozen grapefruit concentrate is also being studied intensively.

The presence of the bitter glucoside naringin, is the chief cause of bitterness in processed grapefruit products. Kesterson and Hendrickson (11) found no significant difference in the amount of naringin in juices extracted from different varieties of Florida grapefruit and also reported that most of the naringin was in the albedo, rag and pulp of the fruit. The degree of bitterness in canned grapefruit juice or frozen concentrate and finishing procedures used, since the quantity of pulp, rag, and albedo in the processed product is determined by these procedures. A method for the estimation of naringin was devised by Ting (23) that is based on the enzymic hydrolysis of it by a glycosidase. With further modifications, this method may provide the processor with a laboratory

procedure for determining, and thereby controlling the degree of bitterness in processed grapefruit products.

Some work also has been started by Olsen (16) to develop uses for grapefruit in products different from those that have been previously discussed, with emphasis on the utilization of grapefruit of high acid content. A canned pasteurized grapefruit product has been made from very sour grapefruit juice by the addition of sugar and a small amount of peel

Classified Ads

SUPERIOR CITRUS TREES available for Fall 1957 and Spring 1958 planting: Valencias, Hamlins, Pineapples, Orlandos and other varieties. Write for quotation and your FREE copy of "Care of Young Citrus Trees." **WARD'S NURSERY**, Box 846, Avon Park, Florida. Phone GLendale 2-7541.

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oil and when this product is mixed with an equal volume of water, a very palatable grapefruit drink is obtained. A clarified grapefruit concentrate of good quality has been prepared and the preparation of either a still or carbonated grapefruit drink from this product is being investigated. Canned blended fruit juices of various types are being consumed in larger quantities yearly and, therefore, the use of grapefruit juice in various types of blends may be investigated during this season; several packs for storage studies may be processed.

From this discussion it should be evident that a great amount of research has been and is being done at the Citrus Experiment Station on problems related to the quality of processed grapefruit products.

Now let us consider what the grower and processor can do to improve the quality of processed grapefruit products. One of the major problems that confronts the processor in his attempt to make products of uniform and acceptable quality is the great variation throughout the entire season in the internal quality of grapefruit that he has to use. This wide variation in fruit exists because of many factors, such as differences in varieties, maturity, cultural practices, rootstock, soil and weather conditions. Sites and Camp (21) discussed some of these factors in relation to the use of citrus fruits, chiefly oranges, for the production of frozen citrus concentrates. Wenzel and Moore (26) reported on the characteristics of concentrates made from different varieties of citrus fruits, including grapefruit.

In general the flavor of processed products made from seedy grapefruit is better than that in products made from seedless grapefruit. Other factors causing wide variations found in the quality of grapefruit sold for processing are the use of fruit for fresh shipments, the fact that only a portion of the grapefruit crop is arsenated, the increased production and use of pink grapefruit, and the tendency for grapefruit trees to bloom and set fruit at different times during the same season. Since such great variation exists in the quality of fruit throughout a season, processed products of variable quality will result if such fruit is used at random. If products of acceptable, uniform, and improved quality are to be packed, the processor must eliminate the grapefruit, which he receives from either packing houses or groves, that is not suitable for use in the specific type of processed

product that is being packed. Also for the complete utilization of the grapefruit crop, culled fruit that cannot be either sold as fresh fruit or used in processed products, will have to be diverted to some other use, such as the production of citrus by-products as recently suggested by Kesterson, Hendrickson and Newhall in a report (12) to a Grapefruit Study Committee of Florida Citrus Mutual. If such culled fruit cannot be profitably used for some other purpose, then it will be better to return it to the grower to be discarded rather than to impose it upon consumers as canned grapefruit juice or frozen grapefruit concentrate of poor and unacceptable quality. Grow-

ers should realize that some of the grapefruit that is being produced cannot be made into canned grapefruit juice, canned sections or frozen concentrate of good quality. It is suggested that growers find out more about the internal quality of grapefruit that is needed by processors for the production of products of good quality; then using information available about the relation of cultural practices and other factors to the internal quality, do what they can to produce fruit that will be suitable and desirable for the production of one or two specific processed products.

(Concluded Next Issue)



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